

PCT

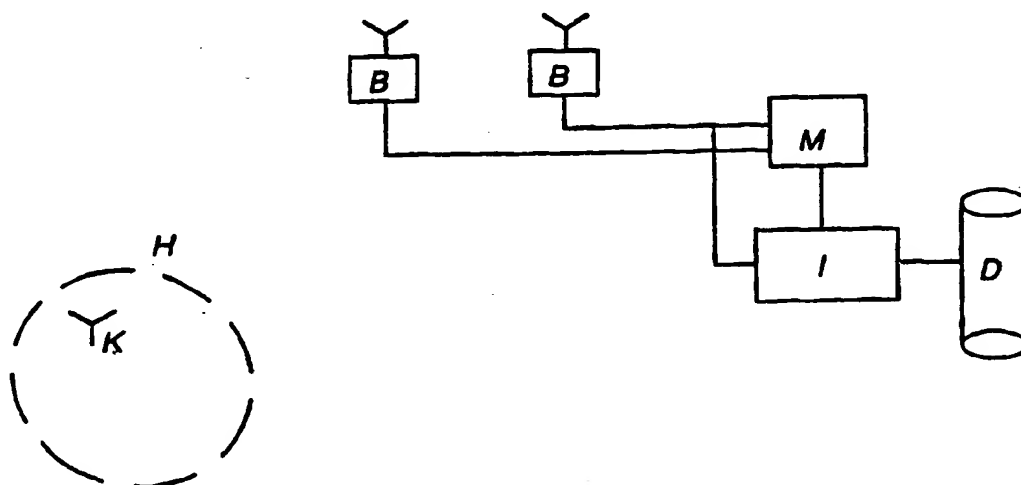
WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>H04Q 7/38</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 97/13387</b> <b>(43) International Publication Date:</b> 10 April 1997 (10.04.97)
<b>(21) International Application Number:</b> PCT/SE96/01176 <b>(22) International Filing Date:</b> 23 September 1996 (23.09.96) <b>(30) Priority Data:</b> 9503521-8 5 October 1995 (05.10.95) SE <b>(71) Applicant (for all designated States except US):</b> TELIA AB [SE/SE]; Mårbackagatan 11, S-123 86 Farsta (SE). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> LARSSON, Lena [SE/SE]; Ringvägen 12, S-117 26 Stockholm (SE). PRE- VEUS, Eva [SE/SE]; Stånggatan 28, S-125 74 Älvsjö (SE). LIDBRINK, Stefan [SE/SE]; Arbetargatan 33 A, S-112 45 Stockholm (SE). <b>(74) Agent:</b> KARLSSON, Berne; Telia Research AB, Rudsjöterrassen 2, S-136 80 Haninge (SE).		<b>(81) Designated States:</b> FI, NO, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

**(54) Title:** IDENTIFICATION OF HOME AREA IN A MOBILE TELECOMMUNICATION SYSTEM



**(57) Abstract**

The present invention relates to a method and device at a mobile telecommunication system for identification of home area (H). The home area is defined by the coverage area for one or more base stations in the mobile telecommunication system. At registration of home area, a customer (K) calls the mobile telephone system via a special call number. The mobile telephone system identifies the call number as well as the customer in question. After that, an equipment for recording of home area (I) is initiated. The customer after that travels around in the intended home area at which the telecommunication system registers which base station/stations (B) are activated during said registration phase. The registration phase can relate to one or more calls to the mobile telephone system. Information regarding which base stations that are activated in connection with registration of the home area (H) is transmitted from the mobile telephone system to the equipment for recording of home area. The information is after that registered in a database (D). The customer after that may have access to certain services within the home area or a lower charge than in the rest of the mobile telephone network.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgyzstan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	KZ	Kazakhstan	SG	Singapore
CH	Switzerland	LI	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovakia
CM	Cameroon	LR	Liberia	SN	Senegal
CN	China	LT	Lithuania	SZ	Swaziland
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	LV	Latvia	TG	Togo
DE	Germany	MC	Monaco	TJ	Tajikistan
DK	Denmark	MD	Republic of Moldova	TT	Trinidad and Tobago
EE	Estonia	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	UG	Uganda
FI	Finland	MN	Mongolia	US	United States of America
FR	France	MR	Mauritania	UZ	Uzbekistan
GA	Gabon			VN	Viet Nam

## 5 TITLE OF THE INVENTION:

## IDENTIFICATION OF HOME AREA IN A MOBILE TELECOMMUNICATION SYSTEM

## TECHNICAL FIELD

10 The present invention relates to mobile telecommunication systems which shall be able to handle geographical areas which have been allotted mobile telephones. Customers which are within their own areas shall at that have possibility to be offered services and special charge settings.

15

## PRIOR ART

20 In the mobile telecommunication networks of today, one and the same charge is provided independent of where in the network the mobile unit is. Further, the same services are provided over the whole network. In the European document 597 638 a cellular mobile telephone system is described where each base station transmits a signal which identifies in which area one is. A customer in this  
25 system can for instance get a low call charge when he/she is in his/her home area, and a higher charge in other cases. The system also can be imagined to have a higher charge at higher load and vice versa. The document does not mention how the home area is registered.

30 In the patent document EP 462 726 is described how one can offer local charges for subscribers who make calls between a mobile telephone system and a wire based system.

In the patent document EP 568 824 is described a cellular mobile telephone system equipped with special transmitters which  
35 transmits area specific identification signals. Mobile telephones belonging to the system detect these signals and return these to the system, at which a lower charge can be obtained if the mobile unit is at the right place. A mobile unit can be registered in a multiple of areas.

5 The American document 5 276 905 describes a cellular mobile communication system where the mobile units are programmed with information about its home area. At registration to the system, the mobile units try in the first hand to connect themselves to its home station.

10 The American document 5 406 614 relates to registration of mobile telephone systems. At the turning on of a mobile telephone, a registration signal is transmitted to closely located base stations. The strength of this signal is judged centrally and the mobile telephone is registered to the area which had the best signal. This registration is stored, and appointed base station is informed. The document, however, does not relate to registration of permanent home area.

15 By the different documents consequently is described how different call charges can be offered in different places in a mobile telephone system. Further registration of mobile telephones in a mobile telephone system is described. The possibility for the subscriber to chose where he/she himself/herself wants to register a home area by dialling a special telephone number is however not described.

## DESCRIPTION OF THE INVENTION

### Technical problem

25

30 In future mobile telephone networks, functions are expected to be introduced to handle the geographical areas which have been allotted the subscribers. This implies that the customers are offered services and also special rate settings when they are within their own areas. In addition, the customer can be offered different services/prices for different areas.

35 An example of area subscription can be a special charge which is used when the customer is within his/her home area/areas. If the mobile is used outside the home area, the customer will be treated as an ordinary subscriber. Alternatively, the mobile shall only be possible to use within the areas which are included in the subscription, but not outside this/these area/areas.

The mobile networks will be able to handle transmission of area number (Location number), which makes possible that services can be

created by means of these. First a geographical area must be allotted its unique location number. When the division into areas has been made, base stations which have coverage over a certain area must be tied to the location numbers in question.

5 To define which areas that shall be included in the customer's subscription, it is necessary to appoint these. The difficulty is that out of a customer management system be able to decide which base stations the customer will utilize when the mobile is used from a home area. Wishes consequently exist for possibility to  
10 automatically register all home areas. If the radio network planning is changed, and other base stations cover the customer's home area, it shall be simple to change the registration of the customer's home area.

Automatic registration of home areas is most suitable at  
15 defining of small areas, where the customer for instance can be offered special charge.

Registration of home areas, which is utilized at present, is made manually from the operator's side. At that the subscriber tells which areas he/she want to utilize as home areas. The manual setting  
20 of home areas is however timeconsuming and does not always correspond with the customer's actual needs. The customer can for instance be unsure of where the borders for the wanted home area are. There consequently is a need for that the subscriber at travelling in different areas can inform the telecommunication  
25 system about where the home area is wanted to be located. Further, it shall be simple to change a home area from one geographical area to another when needed.

The present invention has the intention to solve the above mentioned problems.

30

#### THE SOLUTION

The present invention relates to a method at mobile  
35 telecommunication system. The telecommunication system includes base stations which serve the coverage areas which belong to the base stations. Mobile units are movable within and/or between the coverage areas. The mobile unites are allotted individual home areas which include at least one coverage area. The mobile

telecommunication system identifies the home area at a communication with the mobile unit/units.

Identification of the home area is made at initiation from the mobile units. Initiation is established by call to a special call  
5 number in the mobile telecommunication system. The initiation activates the function for identification of the home area in the mobile telecommunication system. The identification includes identification of the mobile unit and/or concerned subscription/subscriptions and concerned coverage area/areas. Change  
10 of home area coverage is made by a new call to the special call number.

In a further development of the invention, the communications to/from the mobile units regarding subscriptions in question within the home area will render other charges than communication to/from  
15 the mobile units regarding concerned subscriptions outside the home area. Further, a number of the mobile units regarding concerned subscriptions are only allowed to establish communication to/from the own home area. The mobile telecommunication system further registers the home areas automatically. The mobile unit in question  
20 and its subscription, as well as the coverage areas concerned, are registered in a database. In connection with registration of the home area, one or more consecutive calls from the mobile unit can be utilized for identification of the home area.

The invention further relates to a device at mobile  
25 telecommunication system including base stations which serve to the base stations belonging coverage areas. The mobile units are arranged to move within and/or between the coverage areas. Home areas are arranged to be allotted respective mobile units and their subscriptions. The home areas are arranged to be defined by calls  
30 from the mobile units to the mobile telecommunication system. The mobile telecommunication system identifies coverage area/areas in question which is/are defined by the home area/areas of the mobile units.

The mobile units are further arranged to call a special call  
35 number in the mobile telecommunication system at identification of the home area. The mobile units are, at need, arranged to redefine respective home area. Establishing of communication from/to the mobile units in the home area is arranged to render a lower charge than communications established outside the home area.

Communications established within the home area are further allowed to render the mobile unit access to services which cannot be utilized globally.

In a further development of the invention, certain appointed mobiles and belonging subscriptions only can establish communication within the home area. The home areas are further arranged to be automatically registered in the mobile telecommunication system. The home area is defined by the coverage area/areas and concerned base station/stations is/are arranged to be registered in for instance a database. The registration is activated when the special call number is called, and the registration equipment is arranged to identify the mobile unit and the at the registration utilized coverage area/areas. Identification of the home area is made by one or more calls in sequence from the mobile unit to the special call number.

#### Advantages

The present invention allows that a subscriber alone can identify home areas including one or more coverage areas served by different base stations. The invention further allows that a defined home area for a subscriber can be defined by the subscriber. The subscriber is at that allowed to obtain home areas of different sizes. The home areas further are allowed to include one or more coverage areas for different base stations. When the subscriber is within the own home area, the subscriber can get a lower charge than at call established outside the own home area. Certain services in the mobile telephone system further can be appointed to be accessible only within said home area.

The possibility for the subscriber himself/herself to identify the wanted home area implies economical advantages for the telecommunication operator. This because the telecommunication operator need not actively participate in the identification of the home area. In the systems which are previously known, the telecommunication operator has been obliged to manually add which base stations that shall be included in a subscriber's home area. This procedure is resource consuming and expensive. A disadvantage with the previous system further has been that a change of home area requires reprogramming which is performed by the staff of the telecommunication operator. The present invention allows that the

telecommunication operator's work in connection with change of home areas will be considerably reduced.

#### DESCRIPTION OF FIGURES

Figure 1 shows an example of a number of base stations, B with belonging coverage areas  $T_1$ - $T_4$ .

In Figure 2 is shown a number of coverage areas  $T_1$ - $T_4$  and a drawn home area H.

In Figure 3 is shown a device according to the invention where a customer K is in his/her home area H.

#### DETAILED EMBODIMENT

In the following the invention is described on the basis of the figures and the terms therein.

The invention relates to a method to automatically register which area a customer shall have as his/her home area in which for instance a lower charge can be used. The core of the method is that the customer himsel/herself calls from the area he/she wants to have as his/her home area. On that occasion a special equipment shall register from where the call is registered, whereupon this information is stored in a database. The information in the database after that can be used for instance by the system, which after that will process the data.

The procedure starts by that customers call a special number at which "recording of home area" is activated in a special equipment. The special number activates an answering equipment which at the beginning identifies which subscription that is intended. The customer gives, on request from the answering equipment, an identification code. The identification code can for instance consist of figure codes, verbal codes etc. The system after that checks whether the given code is correct or not. In the case that the identification code is wrong, the call is disconnected. If, on the contrary, the authorization check turns out well, the system accepts that "recording of home area" is activated. The customer after that can make one or more calls in sequence which are registered by the equipment. At these calls are in the equipment registered which base



stations that have been involved in the calls during the recording phase, i.e the customers home area. This information is then stored in a database.

The information in the database can for instance be used at processing of data for giving the customer a lower charge when he/she calls from the home area. The service also can contain a function which makes that an optional number of base stations can be included in the home area. The customer in this case can get a higher charge depending on the number of base stations which are included in the home area. Information about home area can further be utilized to give the customer a certain set of services when he/she is in this area.

If the customer wants to move or extend his/her home area, he/she can initiate a new "recording phase". The telecommunication operator in these cases sets the frames which are valid for change of home areas and which procedures that shall be valid for the authorization check at recording of the home areas.

A telecommunication operator provides a mobile telephone system with a number of base stations, B. To each base station a coverage area  $T_1, T_2, \dots$ , belongs, see Figure 4. A subscriber in the mobile telecommunication system wants to obtain a home area, H, according to the dashed line in Figure 2. The subscriber obtains in connection with subscription from the telecommunication operator a special call number which shall be utilized at defining of home area. Utilization of this call number can be provided with certain restrictions. For instance can said number only be possible to utilize during a certain period of time, or be connected with that a certain identification must take place. These restrictions are necessary for that the customers shall not arbitrarily redefine the home area.

In the imagined customer's home area can be seen that this has certain coverage within the areas  $T_1, T_2$  and  $T_3$ .

The customer after that goes to the home area to which he/she wants access. From the home area it calls the mobile telephone system, M, with the special call number. The mobile telephone station receives the call in question and activates an equipment for recording of home area, I. The customer after that travels around in the area he/she wants to define as home area. Depending on how the home area is wanted to be defined, one or a number of calls can be

made to the call number in question. The customer, K, identifies him/herself towards the system in one in itself known way. The identification can for instance be made by codes which are transferred from the keypad of the mobile unit, or by special equipment which transmits identification information to the mobile telephone system via for instance accoustic connection to the mobile telephone. The identification can also be performed in other ways, but since recognized and known methods for this which are well known by the expert in the field exist, no closer description of this procedure is made in this connection.

In connection with establishing of communication between the customer and the equipment for recording of home area, the customer can provide information which is intended to identify whether the call relates to recording of new home area, extension of existing home area, reduction or deletion of an existing home area etc. Transmission of control signals between a subscriber and a telecommunication system is in itself previously known. Since the expert also in this respect is well familiar with procedures of this kind and how control signals are transmitted and registered, no further description of this procedure is necessary.

The equipment for recording of home area, I, receives the information in question from the customer and appoints on the basis of received codes which type of activity that is concerned. At new recording of home area, or addition to previous home area, the equipment for recording of home area registers the activity in question. The customer, K, after that moves in the home area, at which he/she travels through coverage areas in question, in this case the coverage areas  $T_1$ ,  $T_2$  and  $T_3$ . At this journey the base stations, B, which are connected with respective coverage areas, will be activated. The mobile telephone system at that will transmit information to the equipment for recording of home area concerning which base station/stations, B, that are utilized in connection with the initiation of the home area. The home area is after that defined by equipment for recording of home area by appointing which base stations, B, that are included in the home area, H. This information is after that transmittted to a database, D, where the information is stored and utilized at the customer's further utilization of the telecommunication system. The whole coverage area for the base station/stations in question is after that defined as home area. The

registration procedure is after that possibly repeated by a number of calls being consecutively established on each other to define the home area. The home area can for instance consist of a number of smaller areas which are geographically separated from each other.

5 This is not shown in figures since it is trivial to the expert.

In connection with registration of the home area, the number of coverage areas which are included in said home area is registered. Depending on the number of coverage areas that are included in the home area, the customer can have different charges at the

10 utilization of the mobile telephone within the home area.

Consequently the system allows a charge which is lower than for the rest of the mobile telephone system, but which increases depending on the number of coverage areas that are needed for the wanted home area. Further, certain services can be accessible only within the  
15 home area in question. These services can be general services which are provided by the telecommunication system for all within the home area. Another alternative is that certain services are appointed by the subscriber in connection with the subscription at the telecommunication operator. The telecommunication operator in this  
20 case introduces information regarding these services in the telecommunication system, which after that examines whether the subscriber in question is within or outside the home area at communications and decides which service/services that are accessible in different cases.

25 The invention is not restricted to the in the above presented description, or by the following patent claims, but may be subject to modifications within the idea of invention.

30

35

## PATENT CLAIMS

1. Method at mobile telecommunication system, including base  
5 stations serving to the base stations belonging coverage areas, and  
mobile units movable within and/or between the coverage areas and  
subscriptions being allotted the mobile units,  
c h a r a c t e r i z e d in that the subscriptions are allotted  
individual home areas, that the home areas include at least one  
10 coverage area, that the mobile telecommunication system identifies  
the home area at a communication with the mobile unit.

2. Method according to patent claim 1, c h a r a c t e r i z e d  
in that initiation of identification of the home area is made on  
initiation from the mobile units.

15 3. Method according to patent claim 1 or 2,  
c h a r a c t e r i z e d in that initiation is established by call  
to a special call number in the mobile telecommunication system.

4. Method according to any of the previous patent claims,  
c h a r a c t e r i z e d in that the initiation activates the  
20 function for identification of the home area in the mobile  
telecommunication system.

5. Method according to any of the previous patent claims,  
c h a r a c t e r i z e d in that the identification includes  
identification of the mobile unit as well as the subscription.

25 6. Method according to any of the previous patent claims,  
c h a r a c t e r i z e d in that the identification includes  
identification of concerned coverage area/areas.

7. Method according to any of the previous patent claims,  
c h a r a c t e r i z e d in that redefining of the home area is  
30 made by a new call to the special call number.

8. Method according to any of the previous patent claims,  
c h a r a c t e r i z e d in that communication to/from the mobile  
units within the home area for respective subscription leads to  
other charge than communication to/from the mobile units outside the  
35 home area.

9. Method according to any of the previous patent claims, characterized in that a subset of the mobile units at the utilization of the subscriptions are only allowed to establish communication from/to the own home area.

5 10. Method according to any of the previous patent claims, characterized in that the mobile telecommunication system automatically registers the home area.

11. Method according to any of the previous patent claims, characterized in that the mobile unit in question and  
10 the coverage areas in question are registered in a database.

12. Method according to any of the previous patent claims, characterized in that one or more consecutive calls from the mobile units identifies respective home area.

13. Device at mobile telecommunication system, including base  
15 stations which serve coverage areas belonging to the base stations, and mobile units are arranged to move within and/or between the coverage areas which mobile units are allotted or can be allotted subscriptions, characterized in that home areas are  
20 arranged to be allotted respective subscription, that the home areas are arranged to be defined by calls from the mobile units, and that the mobile telecommunication system is arranged to identify the coverage area/areas in question which define the home areas of the subscriptions.

14. Device according to patent claim 13,  
25 characterized in that the mobile units are arranged to call a special call number in the mobile telecommunication system at identification of the home area.

15. Device according to any of the patent claims 13 and 14, characterized in that the mobile units via respective  
30 subscription at need are arranged to redefine respective home area.

16. Device according to any of the patent claims 13-15, characterized in that establishing of communication from/to the mobile units for respective subscription in the home area is arranged to lead to a lower charge than communication  
35 established outside the home area.

17. Device according to any of the patent claims 13-15, characterized in that the mobile units or certain appointed mobile units utilizing certain subscriptions only are arranged to establish communication within the home area.

18. Device according to any of the patent claims 13-17,  
c h a r a c t e r i z e d in that the home areas are arranged to be  
automatically registered in the mobile telecommunication system.

19. Device according to any of the patent claims 13-18,  
5 c h a r a c t e r i z e d in that the coverage areas and concerned  
base stations are arranged to be registered in for instance a  
database.

20. Device according to any of the patent claims 13-19,  
c h a r a c t e r i z e d in that a registration equipment is  
10 arranged to be activated when the special call number is called, and  
that the registration equipment is arranged to identify the mobile  
unit in concerned subscription/subscriptions and the via  
registration utilized coverage area/areas.

21. Device according to any of the patent claims 13-20,  
15 c h a r a c t e r i z e d in that one or a number of calls in  
sequence are arranged to be established from the mobile unit  
regarding subscription/subscriptions in question for identification  
of the home area.

22. Device according to any of the patent claims 13-21,  
20 c h a r a c t e r i z e d in that a first category of services are  
arranged to be utilized irrespective of where in the mobile  
telecommunication system a mobile is, and a second category of  
services are arranged to be utilized within the home area.

23. Device according to any of the patent claims 13-21,  
25 c h a r a c t e r i z e d in that the rate setting from/to the  
mobile units for respective subscription is arranged to be related  
to the number of coverage areas that constitute the home area, at  
communication within the home area.

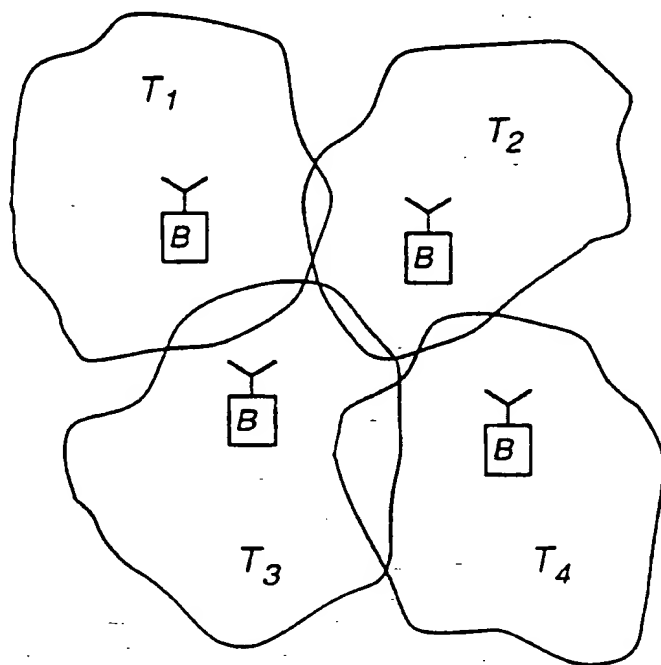


Fig.1

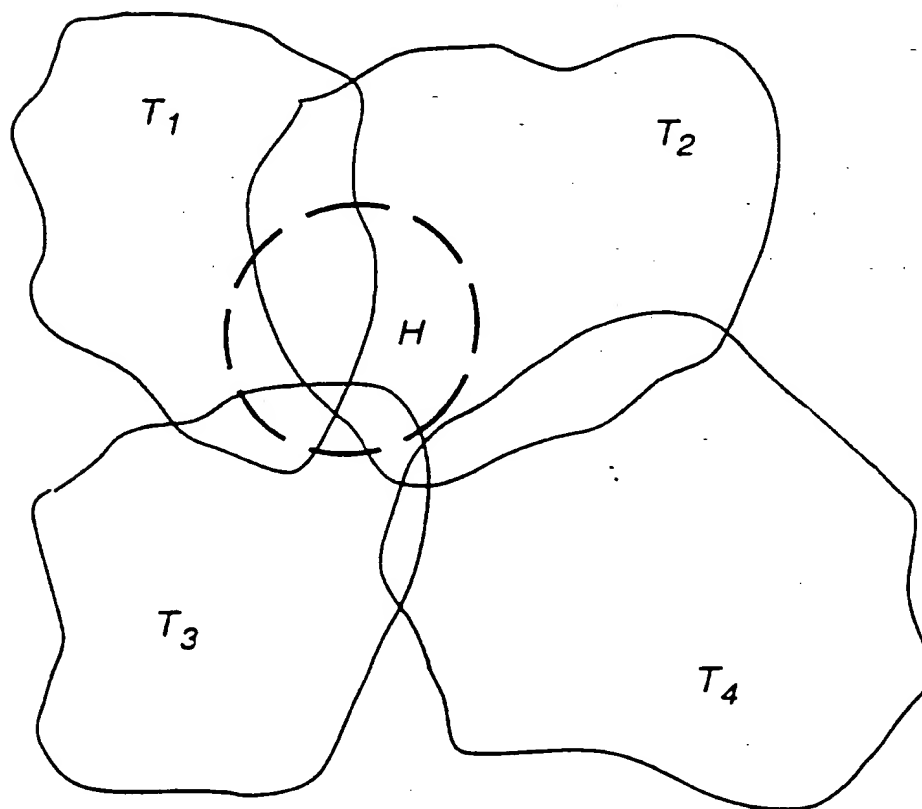


Fig.2

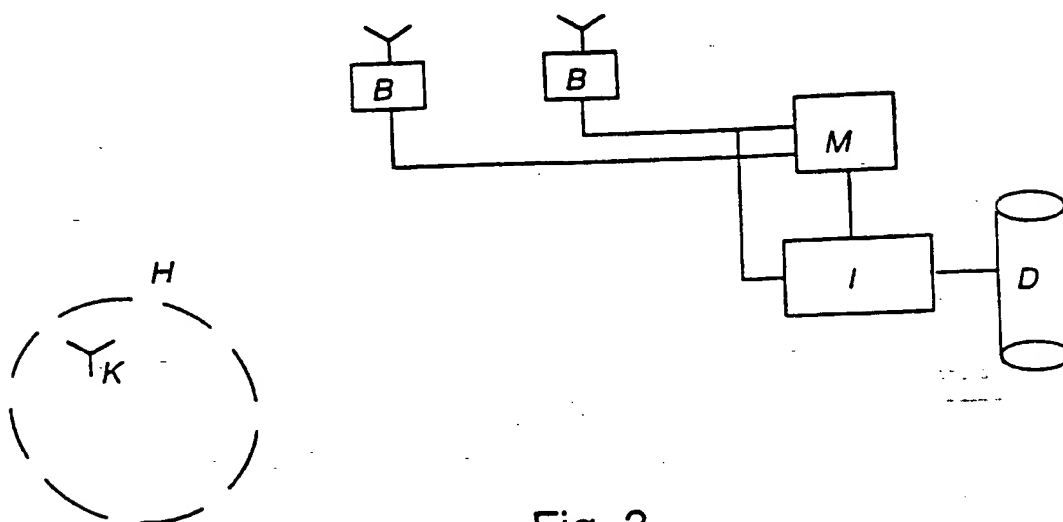


Fig. 3



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 96/01176

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 7/38

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9508902 A1 (TELEFONAKTIEBOLAGET LM ERICSSON), 30 March 1995 (30.03.95), page 4, line 12 - page 5, line 9; page 10, line 7 - line 29; page 12, line 9 - line 18 --	1-23
A	US 5406614 A (HARA), 11 April 1995 (11.04.95), column 2, line 29 - line 53; column 3, line 6 - column 4, line 5 -- -----	1-23

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*B\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

\*Z\* document member of the same patent family

Date of the actual completion of the international search

4 March 1997

Date of mailing of the international search report

05 -03- 1997

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Christina Halldin  
Telephone No. +46 8 782 25 00

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.

PCT/SE 96/01176

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A1- 9508902	30/03/95	AU-A- 7793694	10/04/95
		CA-A- 2147745	30/03/95
		CN-A- 1114852	10/01/96
		EP-A- 0670099	06/09/95
		FI-A- 952485	22/05/95
		JP-T- 8504070	30/04/96
		SE-A- 9303110	24/03/95
US-A- 5406614	11/04/95	JP-A- 5235842	10/09/93